CLAIMS

What is claimed is:

1. A recombinant DNA molecule that encodes a polypeptide, module or domain derived from a chalcomycin polyketide synthase (PKS) gene cluster.

2. The recombinant DNA molecule of claim 1 that comprises a sequence encoding a chalcomycin polyketide synthase module selected from the group consisting of modules 0 to 7.

3. The recombinant DNA molecule of claim 2 that comprises a sequence encoding a chalcomycin polyketide synthase polypeptide selected from the group consisting of ChmGI, ChmGII, ChmGIII, ChmGIV, and ChmV.

4. The recombinant DNA molecule of claim 1 that comprises a coding sequence for a chalcomycin modifying enzyme.

5. The recombinant DNA molecule of claim 4 that comprises a coding sequence for a chalcomycin P450 hydrolase enzyme selected from the group consisting of ChmHI, ChmPI, and ChmPII.

6. A vector that comprises a DNA molecule of claim 1.

7. The vector of claim 6 that is an expression vector.

8. A recombinant host cell comprising the vector of claim 6

9. A recombinant host cell comprising a DNA molecule of claim 1 integrated into the cell chromosomal DNA.

10. A chimeric PKS that comprises at least one domain of a chalcomycin PKS.

11. A cell comprising the chimeric PKS of claim 10

12. A modified functional chalcomycin PKS that differs from the *S. bikiniensis* chalcomycin PKS by the inactivation of at least one domain of the chalcomycin PKS and/or addition of at least one domain of a non-chalcomycin PKS.

13. The modified functional chalcomycin PKS of claim 12, wherein the domain of the chalcomycin PKS or the non-chalcomycin PKS is selected from the group consisting of a loading domain, a thioesterase domain, an AT domain, a KS domain, an ACP domain, a KR domain, a DH domain, and an ER domain.

14. A cell comprising the PKS of claim 12

15. A method to prepare an chalcomycin derivative which method comprises providing extender units to the cell of claim 14.

16. A recombinant expression system capable of producing a chalcomycin synthase domain in a host cell, said system comprising an encoding sequence for a chalcomycin polyketide synthase domain, and said encoding sequence being operably linked to control sequences effective in said cell to produce RNA that is translated into said domain.

17. A host cell modified to contain a recombinant expression system of claim 16.

18. An isolated polypeptide encoded by a recombinant polynucleotide of claim 1.

19. A recombinant host cell comprising a *S. bikiniensis* chalcomycin PKS polypeptide selected from the group consisting of ChmGI, ChmGII, ChmGIII, ChmGIV, and ChmV.

20. The host cell of claim 19 that is *S. fradiae.*

21. A recombinant *S. bikiniensis* cell in which a chmGI, chmGII, chmGIII, chmGIV, or chmV is disrupted so as to reduce or eliminate production of chalcomycin.

22. A recombinant DNA molecule encoding a first protein comprising one or more modules of a chalcomycin PKS and a second protein comprising one or more modules of a tylosin PKS or spiramycin PKS.

23. The DNA molecule of claim 22 wherein the hybrid polyketide synthase comprises one or more polypeptides of a chalcomycin PKS and one or more polypeptides of a tylosin PKS or spiramycin PKS.

24. A recombinant host cell comprising a hybrid polyketide synthase comprising one or more modules of a chalcomycin PKS and one or more modules of a tylosin PKS or spiramycin PKS.

25. A recombinant DNA molecule, comprising a sequence of at least about 200, optionally at least about 500, basepairs with a sequence identical or substantially identical to a protein encoding region of SEQ ID NO:1.

26. The DNA molecule of claim 25 that encodes a polypeptide, module or domain derived from a chalcomycin polyketide synthase (PKS) gene cluster.

27. A method of producing a polyketide, which method comprises growing the recombinant host cell of claim 17 or 24 under conditions whereby a polyketide synthesized by a PKS comprising a protein encoded by said recombinant DNA molecule is produced in the cell.

28. The method of claim 27 further comprising recovering the synthesized polyketide.

29. The method of claim 28 further comprising chemically modifying said polyketide.

30. The method of claim 28 further comprising formulating said polyketide for administration to a mammal.